

ANNALS OF SURGERY

Monthly Review of Surgical Science and Practice.

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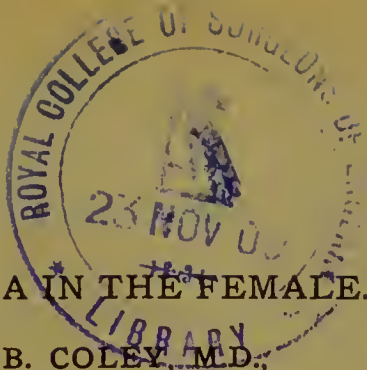
INGUINAL HERNIA IN THE FEMALE.

BY WILLIAM B. COLEY, M.D.,

OF NEW YORK,

Attending Surgeon to the General Memorial Hospital; Associate Surgeon to the Hospital for Ruptured and Crippled.

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INGUINAL hernia in the female constitutes a fairly large percentage of the total number of cases of hernia observed. At the Hospital for Ruptured and Crippled during the last twenty years, we have had 59,404 cases of inguinal hernia of which 9082 were in the female.

Championniere was the first to point out the excellent results that could be obtained by operation, and was one of the first to report a considerable number of cases.

With the help of Dr. D. H. M. Gillespie, I have made an analysis of 1692 cases of inguinal hernia in the female observed at the Hospital for Ruptured and Crippled, with the view of determining, as far as possible, at what period of life the hernia occurred. A special effort was made to ascertain in how many cases of hernia in adult life the hernia had existed in infancy or early childhood. These statistics show that it had so existed in 66 out of 1085 cases, or in 6 per cent. of the cases. It is probable that in a very considerable number of other cases the hernia had actually been present during infancy or childhood, but had been forgotten in the long interval that had elapsed.

TABLE I.—AGE OF PATIENTS AT TIME OF FIRST VISIT TO THE HOSPITAL.

	Single.	Double.	Total.
Up to 1 year of age.....	140	24	164
1 to 5 years of age.....	171	21	192
5 to 10 years of age.....	150	32	182
10 to 14 years of age.....	56	4	60
15 to 21 years of age.....	83	11	94
21 to 31 years of age.....	164	30	194
31 to 41 years of age.....	254	57	311
41 to 51 years of age.....	177	54	231
Over 51 years of age.....	185	70	255
Age not stated.....	6	3	9
	1386	306	1692
			609

TABLE II.—CASES KNOWN TO HAVE HAD A HERNIA AT 14 YEARS OF AGE.

	Per cent.
34 of 94 between 15 and 21 years of age.....	36.1
19 of 194 between 21 and 31 years of age.....	9.8
8 of 311 between 31 and 41 years of age.....	2.5
2 of 231 between 41 and 51 years of age.....	.8
3 of 255 over 51 years of age.....	1.2
66 of 1085 cases.....	6.

ANATOMICAL VARIETIES—INDIRECT OR OBLIQUE HERNIA AND DIRECT HERNIA.

Some writers ¹ state that direct hernia in the female is even more frequent than in the male. Our observations at the Hospital for Ruptured and Crippled are entirely at variance with this view. In making an estimate of the relative frequency of the two varieties one can consider only such cases as have been subjected to an operation, inasmuch as a positive diagnosis cannot be made without operation. Yet, the writers who believe that direct hernia in the female is comparatively frequent, pass their opinion upon a clinical diagnosis alone, unconfirmed by operation.

I have personally operated upon 353 cases of inguinal hernia in the female, of which 170 were adults and 183 children, and only 2 in this entire series were direct herniæ. Both of these cases occurred in adults; one was operated upon six weeks ago, a double inguinal hernia with the bladder in the sac on the right side. This gives a proportion of six-tenths of one per cent., or, if we count the adults alone, as there are practically no direct herniæ in children, it is 1.2 per cent. Comparing this with the cases of direct hernia in the male, I have operated upon 1776 cases of inguinal hernia in the male, of which 815 were adults; 961 children. Of these I have observed 50 cases of direct inguinal hernia, or about 3 per cent. If we consider adults alone, which is the only correct way, we have 5.5 per cent. in male and 1.2 per cent. in the female, which would make direct hernia in the male occur 5 times more common than in the female.

¹ Escher, Deutsch. Zeit. f. Chir., 1899. B. iii, 53, H. 5.

Etiology.—I believe that inguinal hernia in the female, or at least all cases of oblique inguinal hernia in the female, are due to a persistence of the process of peritoneum known as the canal of Nuck, which corresponds almost exactly with the vaginal process of peritoneum in the male. That this process remains patent in many children long after birth, even into adult life, has been proven by a large number of investigators.

That the formation of the canal of Nuck is similar to the formation of the vaginal process of peritoneum in the male, is disputed by a number of writers, some, *e.g.*, Martin and Waldeyer, holding that this canal is a normal occurrence; others, like Duplay, believe it to be anomalous.

My own belief, based upon a careful study of 350 cases of inguinal hernia in the female, operated upon personally, is that the canal of Nuck is a normal development, which remains open in all cases in which a hernia subsequently develops as well as in many other cases that never have a hernia. This congenital process of peritoneum, by its failure to close I regard as the great and all-important cause of inguinal hernia in the female, as well as in the male, although in addition there are usually present various exciting causes, such as persistent crying in infancy and young children, straining of stool, heavy lifting, and coughing in adult life.

Karl Hemmerdinger in his inaugural dissertation (1902) speaks of the relation between congenital inguinal hernia and the descent of the testis or ovaries and the patency of the vaginal process of peritoneum in the male and the so-called Nuck's diverticulum in the female. He enters somewhat fully into the history of the development of the inguinal region, a knowledge of which is necessary in order to understand the mechanism of congenital inguinal herniæ.

Careful examination of an embryo eight weeks of age, shows at the lower end of the primitive kidney a second peritoneal fold running toward the inguinal region. This fold includes a rather coarse band of connective tissue, called the inguinal band, or cord of the primitive kidney. The same

plays an important rôle in the development of the male and female genital organs. In man it later becomes Hunter's gubernaculum; in woman, the round ligament.

The ovaries, the same as the testicles, undergo considerable change of location in their descent. In the third month of embryonic life they pass from the lumbar vertebra into the small pelvis. It is upon this descent of the ovaries that the above described inguinal band of the primitive kidney (which is also present in the female) is destined to act. During this process the inguinal band separates into three sections and enters into firm union with Müller's ducts at the point where they combine and form the sexual cord. The upper section, consisting of smooth muscle fibres, originates in the parovarium and is embedded in the hilus of the ovary. The continuation of this section is the ovarian ligament, and this, passing into the third and most highly developed section of the inguinal cord, forms the round ligament.

As to the origin of the canal of Nuck, Hemmerdinger believes that it is produced by the same causes that are responsible for the vaginal process in the male, even though there be apparent differences.

According to Bramann's observations, the vaginal process in the male originates in the following manner:

In the beginning of the seventh month of embryonic life a small indentation of the peritoneum occurs at the spot where the gubernaculum leaves the abdomen; at the same time the testicle passes into the scrotum. As the testis descends, the above-mentioned indentation becomes elongated. The same factor that causes the testicle to be drawn into the scrotum, elongates the small peritoneal sac lying before it. If this agent ceases to exert traction upon testicle and peritoneal sac, the latter's descent is arrested.

Thus, the peritoneal diverticulum is present before the testicle begins to traverse the abdominal walls. Hence, the vaginal process cannot be considered the result of a bulging of the peritoneum caused by the testicle. On the contrary, the testicle and vaginal process are united, and descend together.

The agent which draws downward the testicle and at the same time forms the processus vaginalis, has been called by Soulie, *un cordon cellulaire plein* (a plain, cellular cord). This cord may cause a diverticulum of the peritoneum and leave the testicle within the abdomen. Many of my cases prove the truth of this opinion.

In an analogous manner the same cord causes a protrusion of the peritoneum in the female, which is then called Nuck's diverticulum. Hence, both vaginal process and Nuck's diverticulum are due to the same cause in man and woman.

Herman Meyer of Zurich has made extensive investigations as to the relation of such peritoneal diverticuli to the development of inguinal hernia. He found in a new-born dog on either side of the abdominal wall an opening which led into a diverticulum 9 to 12 mm. in length; the same was situated outwardly and in front of the round ligament.

In the female foetus of three to eight months, he found the same diverticulum six times, ranging in length from 1.75 to 10 mm., and in relatively the same position to the round ligament.

In new-born children and infants, Zuckerhandl found the canal of Nuck open in 37 per cent. of the cadavers examined; Féré in 9.2 per cent., sometimes on one side only, sometimes on both.

The reason many writers fail to recognize this canal is that the abdominal opening is difficult to find. Nobbe states that even in those cases in which the entrance to the vaginal process is relatively wide, the communication between the diverticulum and peritoneum is not always promptly found, as the cavity is covered by a fold of peritoneum and the transverse fascia. Only in the eighth cadaver examined (a girl three-fourths of a year old) was Nobbe able to recognize a canal of Nuck open on both sides. The diverticulum on the right side was 16 mm. in length and 3 mm. wide; the entrance opening was 8.5 mm. wide. On the left side the diverticulum was 17 mm. long; entrance opening 2.5 mm. and canal 3 mm.

According to Sachs the obliteration of the vaginal process is due to granulation.

Féré found in one case in the entrance opening a protruding mass the size of a millet seed, which he interpreted as an exudate causing the obliteration. This obliteration may be complete or partial, which enables one to explain the different shapes of the hernial sac in external herniæ and hydroceles.

As regards the frequency of the patency of the vaginal process of peritoneum, Hemmerdinger states that this increases with advancing age. In the first ten to twenty days after birth obliteration proceeds very rapidly and comes to a completion in about 50 per cent. of the cases. From the twentieth to the thirtieth day after birth, the number of cases with total obliteration is much smaller, while there is a marked increase in the cases with an entirely open vaginal process.

Camper found in a series of 70 new-born babies, both vaginal processes open in 34; the right vaginal process in 14 and the left vaginal process in 8 cases.

Zuckerhandl examined 100 children during the first three months of life and found in 57 infants an unobliterated vaginal process on both sides in 20; on the right side in 12 and on the left side in 5 cases. In 188 children up to 3 years of age, examined by Féré, the vaginal process was found partially obliterated on both sides in 11, on the right side in 16 and on the left side in 14. In 18 obliteration had not taken place at all.

Of these 59 cases 32 were below 1 month of age, 6 from one to three months and only 10 were above six months.

From the above investigations it appears that the vaginal process of peritoneum becomes obliterated earlier on the left than on the right side, which may be explained by a later descent of the right testicle.

Similar conditions obtain as regards the canal of Nuck in the female. Hugo Sachs who examined 100 children within the first year states "The persistence of the canal of Nuck

is much rarer than that of the vaginal process in the male. In 75 per cent. of these children Nuck's diverticulum was obliterated at the moment of birth. Whenever it was not obliterated at that time, it showed very little inclination to become obliterated later."

Nobbe arrives at the following conclusions, based upon his own investigations as well as a study of the literature: (1) The canal of Nuck is found in about 8 to 10 per cent., while the vaginal process is found open in 30 to 40 per cent. (2) Obliteration occurs usually post partum, rarely ante partum. (3) The diverticulum is generally found open on both sides; more rarely it is found open on one side. If the canal does not become obliterated, it represents a preformed passageway for the herniæ.

Frequently the cavity of the vaginal process in the female becomes filled with a serous fluid (hydrocele muliebris).

Hemmerdinger reports the history of a case of hydrocele in the female observed at the Freiburg Clinic. Hydrocele in the female is not so exceedingly rare as was formerly believed. Wechselmann² in 1890 reported 62 cases, and in 1892 I published 15 cases observed at the Hospital for Ruptured and Crippled. In 353 adult cases of inguinal hernia in the female which I operated upon, hydrocele of the canal of Nuck was found in 11 cases.

As regards the etiology, I believe with Hemmerdinger, that hydrocele of the canal of Nuck is due simply to a failure of the diverticulum of Nuck, or the processus vaginalis, to completely close. The condition is really never more than an accumulation of fluid in the lower end of an actual or potential hernial sac.

E. Scott Carmichael of Edinburgh, has contributed some valuable facts upon inguinal hernia in the female (Trans. of the Medico-Chir. Soc. of Edinburgh, 1905-6, p. 226). His conclusions are based upon a statistical study of 729 radical operations in both sexes, treated by Harold Stiles and

² Arch. f. klin. Chir., 1890, 40, 578.

himself. In this series of cases 5 to 10 per cent. occurred in the female. In 184 radical cures performed by Carmichael in children, 23 were females. Of the 729 radical operations in both sexes, 76 were in girls, giving a percentage of 10. 21 were under one year of age; 21 were under five years of age, and 34 were over five years of age. 39 were on the right, 24 on the left side, and 13 double.

A study of the contents of the sac is of great interest. The following contents were either found in the sac or could be pulled down into the sac in 28 cases:

Fallopian tube and ovary.....	17
Fallopian tube alone.....	5
Small intestine	2
Omentum	2
Cæcum and ovary and Fallopian tube.....	1
Vermiform appendix and ovary and Fallopian tube.....	1

In two cases the sac was tuberculous.

Carmichael states that it is suggestive that the persistence of the so-called canal of Nuck should be associated in such a large percentage of cases (over 30 per cent.) with malposition of the ovary and Fallopian tubes. In the young child the position of the ovaries and tube shows great variation. Sometimes the ovary lies longitudinally along the lumbar vertebræ, resting on the psoas muscle; again, it may be found on the false pelvis or in the cavity of the true pelvis. Carmichael believes that the action of the gubernaculum or inguinal ligament may be in some way responsible for the position of the ovary. He does not believe that it is possible to explain the presence of the ovary and Fallopian tube in 24 cases out of 28 by simple mechanical causes, but thinks that in some way it is associated with the development of the inguinal ligament. That the formation of the canal of Nuck is analogous to the processus vaginalis in the male, Carmichael believes to be doubtful.

He regards the canal of Nuck an abnormal protrusion, associated with the development of the inguinal ligament. He points out the fact that the ovary and tube do not lie

free in the sac in the same sense as a loop of intestine and omentum, but are intimately associated with its wall, the broad ligament or mesosalpinx springing directly from the posterior aspect of the sac. The relation of the ovary to the sac very closely resembles that found between the sac and the cæcum and sigmoid.

Lockwood regards ovarian hernia due to abnormal length of the mesovarium or mesosalpinx. Carmichael's series of cases does not support this view. His cases show a large percentage of inguinal hernia in the female to be bilateral. In babies under one year, of 21 cases 8 were double; of 21 under five years, 2 were double; of 34 over five years, 3 were double.

A much greater frequency of ovarian hernia in the very young is also shown by Carmichael's statistic:

In 21 under one year, ovary and tube were found in 13 cases; in 21 under five years, ovary and tube were found in 7 cases; in 34 over five years, ovary and tube were found in 2 cases.

The very large proportion of ovarian herniæ shown by Carmichael's statistic is probably due to the fact that 21 out of 76 patients were individuals under the age of one year; 21 others were under five years.

Practically all of my cases were over four years of age, and 170 of them were in adults. While I have seen a considerable number of cases in infants and young girls in which I was able to palpate the ovary, in only a very small proportion of the older patients was the ovary found at operation.

Bladder hernia in my own experience is an extremely rare condition in the female. My series of 350 cases shows only two examples of bladder hernia, both of the paraperitoneal variety. In both of these cases the hernia was of the direct type.

Eggenberger (*Deutsche Zeit. f. Chir.*, Oct., 1908) whose paper upon bladder hernia gives the most recent and most complete statistics of the subject, was able to add 110 cases to the 182 cases twelve years previously collected by Brunner. The sex is given in 241 cases, 168 of which were males, 73

females. While Brenneisen gives the proportion of male to female cases as 3:1, Eggenberger's personal statistic shows a ratio of 3 males to 2 females. Of the male cases, 55 were inguinal, 5 femoral hernia; of the female cases 15 were inguinal, 23 femoral hernia.

I have personally never seen a cystocele in a femoral hernia. One of my cases, a large irreducible inguinal hernia, contained an incarcerated appendix with considerable fluid in the sac.

Tumors of the hernial sac, while found in both male and female, are much more common in the female, taking the form of a cyst, or the so-called hydrocele of the canal of Nuck.

Solid tumors of the inguinal canal are extremely rare. Kepler (*Boston Med. and Surg. Jour.*, Aug. 20, 1908) reports a case of dermoid cyst of the canal of Nuck and gives a very careful review of the literature. His case occurred in an unmarried woman, 26 years of age, who had worn a truss since childhood for a supposed right inguinal hernia. The hernia became apparently cured, but re-appeared two years prior to the date of the operation. The symptoms were strongly suggestive of catarrhal appendicitis with recurrent attacks. Examination showed a sausage-shaped painless swelling in the right inguinal canal which occasionally disappeared for a short time. This had been irreducible for about a year. Operation showed a mass occupying the canal of Nuck which could be displaced upwards about two inches. On opening the tumor there was an escape of much thick cheese matter with hair. Pathological examination was made by Dr. Leary of Tufts Medical College and showed it to be a cyst of the canal of Nuck. Microscopical examination proved it to be dermoid in character. Kepler's careful review of the literature showed this to be apparently a unique case.

I have seen one case of Fallopian tube in the sac of a femoral hernia. It was irreducible and very adherent. The patient was aged 29 years and the operation was performed February 4, 1909.

I have operated upon one case of multiple cyst of the canal of Nuck February 5, 1909. The patient was 41 years of age and had had a swelling of several years' duration in the right inguinal region; it had never been reducible. Operation disclosed four cysts of various sizes not communicating with one another, the uppermost one occupying the inguinal canal, separated from the abdominal cavity by a thin layer of peritoneum. The size and anatomical situation of the cysts are shown (Fig. 1).

Unusual Cases of Inguinal Hernia in the Female.—Inguinal hernia of tube and ovary, one case aged 12 years; one case aged 6 years; one case aged 3 years; one case aged 48 years. Strangulated hernia of appendix with large amount of exudate, one case, aged 35 years (Fig. 2). Double direct hernia with the bladder on the right side, one case, aged 55.

Interstitial Hernia (Case I).—*Strangulated interstitial hernia the size of a cocoanut, containing cæcum and ascending colon.* This case is so extremely rare, that it merits a detailed report.

Mrs. S., 40 years old, was admitted to the Hospital for Ruptured and Crippled in the afternoon of May 11, 1908, and operated upon immediately. She gave no history of ever having had a hernia, but three days before began to have pain and discomfort in the right lower abdomen, accompanied by almost complete obstipation, some nausea. The symptoms became gradually more severe. The nausea increased and was followed by slight vomiting. Before she was admitted to the hospital she had been examined by the house surgeon, who found a tumor in the right lower abdomen which was tender on pressure and irreducible. I saw her about an hour after admission; the pulse was 120, temperature 99.5°. While her general condition could not be called good, she did not show very marked prostration. She was fairly stout, with considerable adipose tissue in her abdominal wall.

Physical examination showed practically nothing abnormal on inspection. On palpation a tumor the size of a grape fruit or two fists could be made out in the right iliac region, extending up nearly to the level of the umbilicus and downward as far as the inguinal region. There was, however, no tumor either in

FIG. 3.



Strangulated interstitial hernia in the female.

FIG. 4.

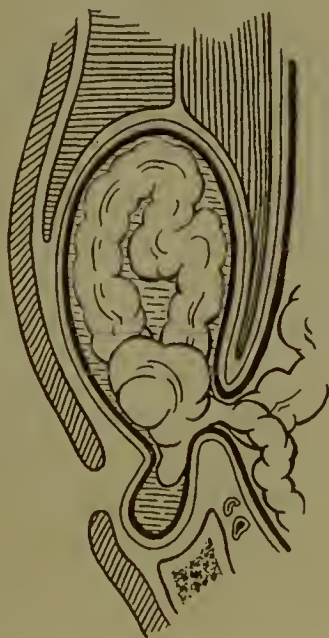


Interstitial hernia in the female, associated with hydrocele in the canal of Nuck. (Bull and Coley.)

currence and very few cases have thus far been reported. The first in this country was, I believe, the one reported by Dr. Bull and myself, in the *New York Medical Journal* in 1890. In this case the hernia was associated with a large hydrocele of the canal of Nuck which we at that time regarded as furnishing the mechanical obstruction which caused the hernial sac to proceed upwards beneath the aponeurosis of the external oblique (Fig. 4).

CASE II.—*Properitoneal Hernia in the Female*.—A. M., aged 49, with a history of having had more or less discomfort in

FIG. 5.



Interstitial hernia in the female. (Coley.)

the right iliac region for a number of years; had never worn a truss. In the middle of February, 1909, she came to the Hospital for Ruptured and Crippled with a swelling about the size of a goose egg or small orange in right iliac and upper inguinal region. The swelling had appeared suddenly ten hours previous to her coming to the hospital, and was accompanied by a good deal of colicky pain, but no vomiting. The swelling was reduced by the house officer without an anæsthetic and the patient returned home. Two weeks later she was admitted to the Hospital for Ruptured and Crippled under the diagnosis of inguinal hernia, although one of the surgeons who saw her in the out-patient

department regarded it as femoral hernia. The hernia was not down at the time of examination.

I operated upon the patient March 5, 1909, at the Hospital for Ruptured and Crippled. The usual Bassini incision was made over the inguinal canal; but on cutting down, I could find no enlargement of the external ring, in fact, I could hardly find an opening sufficiently large to introduce a director. This fact, together with the discovery of a mass of fat the size of an English walnut, in the femoral region, made me suspect an error in diagnosis and to think that we had really to deal with a femoral rather than an inguinal hernia. Careful dissection, however, of the mass of fat failed to disclose any sac whatever in the femoral canal. I thereupon opened the aponeurosis of the external oblique over the inguinal canal nearly to the level of the anterior superior spine and downwards through the external ring, which was not at all enlarged. Directly under the aponeurosis at the lower point, near the external ring, I found what proved to be a large hernial sac which extended upwards beneath the internal oblique muscle and the aponeurosis for a distance of at least 3 inches. On opening the sac it was found empty. The neck of the sac, about one inch in diameter, was situated at about the site of the normal internal ring. The anatomical situation of the sac between the internal oblique and transversalis fascia is well shown by the accompanying illustration (Fig. 6). The sac was removed, the opening in the peritoneum closed and the sheath of the rectus muscle was cut and reflected and, with the internal oblique, sutured to Poupart's ligament. The patient made an uninterrupted recovery.

The only other case of true properitoneal hernia in the female which I have been able to find in the literature in addition to the two cases in Göbell's collection, is the case reported by Sultan, in his paper on "The Mechanism of the Retrograde Incarceration of the Gut" (*Centralbl. f. Chir.*, Dec. 28, 1907), with three illustrations. In this case, however, no operation was performed. The condition was found at autopsy.

The patient, a woman 53 years of age, entered the hospital on September 19, 1907, with symptoms of perforative peritonitis. She was in a moribund condition at the time of entrance, so that it was impossible

to operate. She died one and one-half hours later. Autopsy showed a hernia in the right iliac region between peritoneum and fascia, *i.e.*, an inguinoproperitoneal hernia. The sac contained two loops of small intestine and a mass of omentum. The hernial orifice lay in the internal inguinal ring, yet there was no constriction at this point. The strangulated loop of bowel was situated in the abdomen proper, showing the rare condition of retrograde incarceration.

Cumston (*ANNALS OF SURGERY*, 1905, p. 427) in a paper upon Interstitial Hernia, emphasizes the fact that the condition is extremely rare in the female. Of the 69 cases of inguinoproperitoneal hernia collected by Göbell only 2 were in the female.

Our knowledge of interstitial hernia is based chiefly upon the exhaustive paper of Göbell (*Deutsche Zeitschr. f. Chir.*, Bd. lvi). Of 115 cases collected by Göbell, only 4 occurred in women.

Cumston states that in the 11 cases collected by him up to 1900, not a single one was found in the female. He reports a personal case occurring in a girl of nine. Shortly before operation she had symptoms which were supposed to point toward appendicitis, which disappeared on confinement to bed. The symptoms were believed by Cumston to point toward a partial strangulation, which was relieved by horizontal position. The operation disclosed a bilocular sac, the lower end extending into the labium, the upper occupying a position between the internal and external oblique muscles.

Auvray (*Gazette*, June 10, 1901) reported a case of interstitial hernia in the female observed in 1900, and this case was believed by Cumston to be the first recorded case. He had, however, overlooked the case operated upon by Dr. Bull in 1890 and published in detail by Bull and Coley (Fig. 4).

Another case was operated upon by Helferich and reported the following year by Müller. Fredet reported a case in 1901; two others were reported in the same year by Brunco, in his thesis.

Intraparietal Hernia.—A most interesting case of interstitial hernia observed at Helferich's clinic was reported by Müller in his inaugural dissertation (1901).

The patient, who claimed to have never had a hernia, suddenly noticed a tumor in the inguinal region after lifting a child. One month later the hernia became irreducible and the patient entered the clinic. The diagnosis of interparietal hernia was made and immediate operation advised. The latter revealed half of the sac in the labium major, the other half between the external and internal oblique muscle, external to the inguinal canal. Isolation of the interparietal part of the sac was easily accomplished, while that of the portion in the labium major caused considerable difficulty.

Müller states that outside of the above, only 11 such cases have been observed—all males; 5 of these were reducible; 5 incarcerated; 1 was found at autopsy; and all 11 were cryptorchids. Müller considers the case reported by him of special interest, as he believed it represented the first well-authenticated case of a hernia situated between the external and internal oblique in a woman, and also the first case that was irreducible. He had overlooked the case of Bull and Coley published ten years before. He states that the narrowness of the inguinal canal in the female and its greater length as compared to that in the male, account for the relative rarity of inguinal hernia in the female.

According to Jobert, the right inguinal canal in both sexes is wider than the left, which explains the greater frequency of inguinal hernia on the right side, at least in the female. Both of my cases occurred on the right side, as also did Dr. Bull's case.

Müller states that inguinal hernia of congenital origin is more frequently observed on the right than on the left side, and he believes that in the case reported the hernia was probably congenital, although the patient was not aware of its presence. For, only the pre-existence of a hernial sac, as shown by the investigations of Roser, Linhart and English, renders the sudden appearance of a hernia possible. This is also my opinion, and the conditions found in both of my cases strongly confirm this view. In one case the lower loculus of the sac passed beyond an external ring too small to permit the passage of hernial contents.

The first exhaustive description of an interstitial hernia

was published by Goyrand in 1836. Göbell, in his work "On Interparietal Inguinal Hernia" (*Deutsche Zeitschr. f. Chir.*, lvi Bd.) gave a critical review of the literature of the subject and suggested a nomenclature which, Müller thinks, well worthy of general adoption. He distinguished complete and incomplete hernia, subdividing these into:

1. Inguinoproperitoneal hernia.
2. Inguinointerstitial hernia.
3. Inguinosuperficial hernia.

These might be further divided into monocular and bilocular interparietal herniæ.

The monocular herniæ are usually congenital, while the bilocular may be either congenital or acquired.

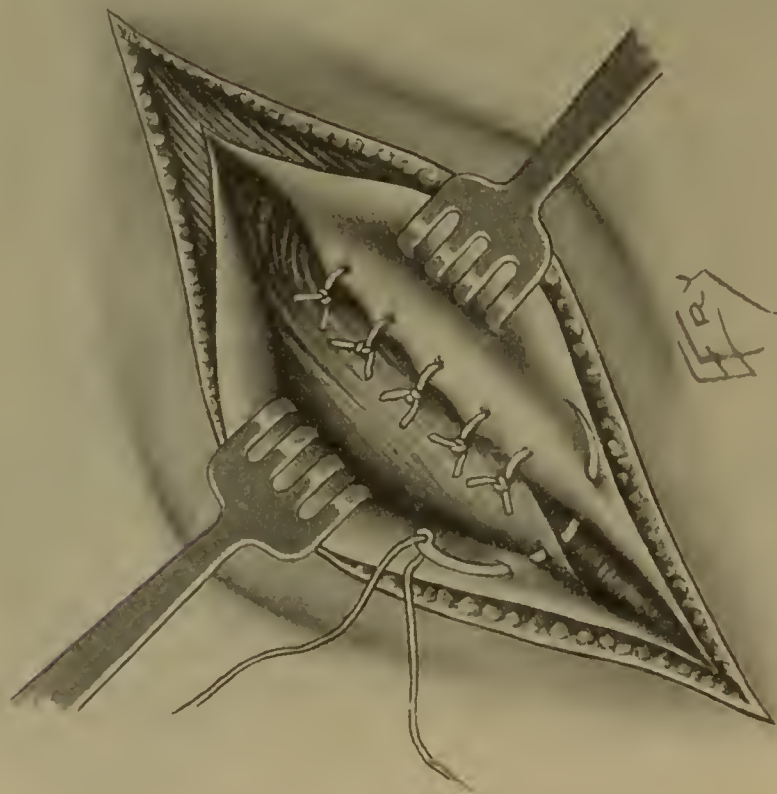
The principal etiological factors in the development of these herniæ Müller believes to be (1) The anatomical structure of the canal; (2) An impediment (either mechanical or anatomical) to the passage of the hernial contents.

Inguinoproperitoneal hernia had been observed 69 times up to the writing of Müller's dissertation; 67 times in men and only twice in women. Only 7 were reducible; the remainder showed symptoms of incarceration, and in the majority of cases the hernia was not discovered until the time of operation.

The hernia was found on the right side in 37 cases; on the left, in 23; in 9 the side was not stated. Sixty of these herniæ were bilocular.

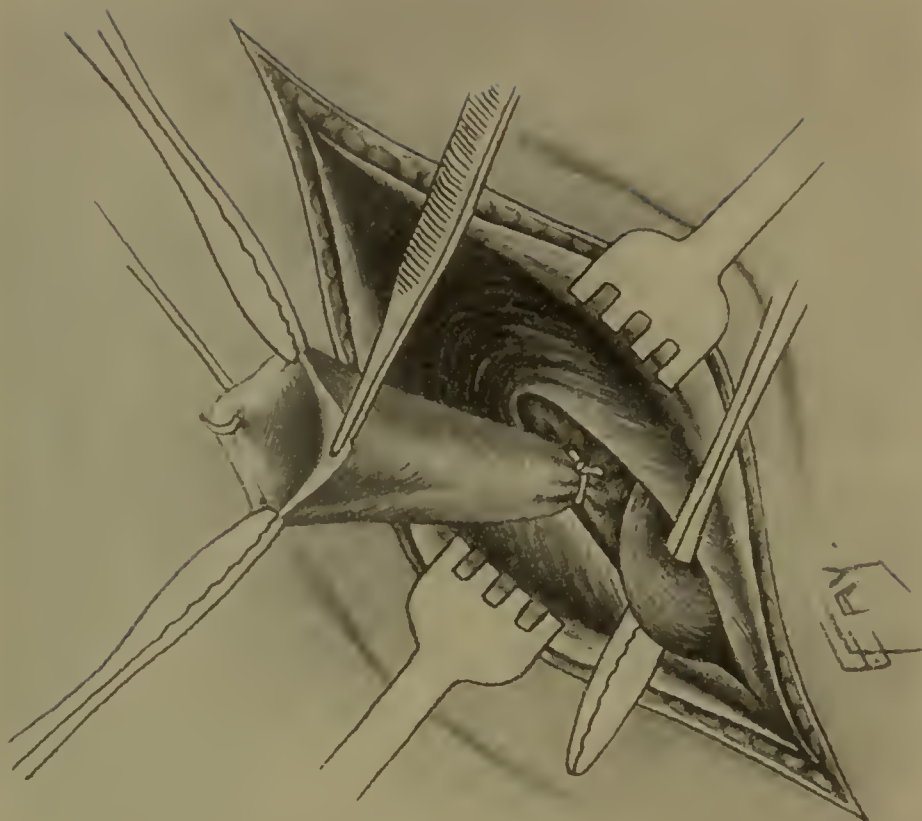
Of inguinointerstitial hernia, Müller found 200 cases reported. Of these 162 occurred in men, 38 in women. 129 and 34 of these respectively, are included in Macready's statistics of reducible herniæ. They were not operated upon nor was autopsy performed; hence, all anatomical data are absent. In the remaining cases the histories are sufficiently explicit to enable one to determine in which interstices of the muscles the sac was found. Most frequently it was noticed between the external and internal oblique, and of this variety, as has been stated before, only 12 cases (including Müller's) are known. My own case makes 13.

FIG. 8.



Modified Bassini method. Suture of the internal oblique to Poupart's ligament.

FIG. 9.



Inguinal hernia in female showing sac dissected from round ligament.

For this reason, I do not go so far as Stiles and Carmichael of Edinburgh and some of the French surgeons, notably Broca, in advising operation during this period of early infancy. The statement which I have already referred to, that our statistics at the Hospital for Ruptured and Crippled show 6 per cent. of adult cases of inguinal hernia in the female in which the hernia existed during infancy and childhood, although short of the actual truth, still show that a large number of the cases that occur in early life, are cured without operation, for we know that inguinal hernia in the female is far more frequent during infancy than at any other period of life. Personally, I seldom advise operation in children under the age of three to four years; first, because I prefer to give the child the chance of a mechanical cure, and, second, because there is little risk from strangulation at this age. I have never seen a case of strangulation in inguinal hernia in the female under the age of fourteen. In addition, should strangulation occur, the mortality of operation is very small. In 20 cases of strangulated hernia in children at the Hospital for Ruptured and Crippled, we have not had a single death. After the age of three to four years, we believe it wise to operate on practically all cases. The operation is simple, free from risk, and the child need not be confined to the bed more than 10 days or two weeks. Adults I usually keep in bed for two weeks and allow them to go home at the end of two and a half weeks.

Method of Operation.—The method of operation which I have employed has been the same in the entire series of cases, and consists in an operation practically identical with the modified Bassini operation which Dr. Bull and myself introduced at the Hospital for Ruptured and Crippled in 1892. (See ANNALS OF SURGERY, 1895, '97 and '98.) The only variation from the typical Bassini operation is that the cord is not transplanted, but allowed to emerge at the lower angle of the wound. In the female the round ligament is treated the same way as the cord in the male, in that it is left undisturbed at the bottom of the wound, the internal oblique

being sutured to Poupart's ligament; the aponeurosis is then closed and last of all, the skin as shown in Figures 8 and 9.

The transplantation of the round ligament as proposed and carried out by Howard Kelly ("Operative Gynæcology") at Johns Hopkins, is entirely unnecessary and has not given as good results as when it has been allowed to remain undisturbed.

Some surgeons, among them Championniere, have removed the round ligament along with the sac, for the reason that the dissection of the sac from the ligament is much more difficult than the dissection of the sac from the cord in the male.

However, with a little care, and going about the dissection in the right way, one can always separate the sac from the round ligament, and I have always done this, believing it unwise to unnecessarily sacrifice the ligament. The sac is then dissected high up beyond the neck and closed by transfixion with a catgut ligature, the wound being then closed in the way I have described in the modified Bassini operation (the Bassini method without the transplantation of the cord).

Results.—In this series of 353 cases, there has been no death and but two relapses, and the large majority of cases have been traced to final result. One of the relapses occurred in a woman 35 years old, two years after operation, and was brought on by very heavy lifting which, at the same time, caused a hernia on the sound side. The second relapse was anticipated, for the reason that the operation was performed in a woman seven months pregnant, 35 years of age, with a very large strangulated inguinal hernia the size of two fists. The sac and outlying tissues, including fascia and muscles, were infiltrated with exudate and the gut was in a precarious condition. The operation was performed as rapidly as possible and the wound closed with drainage. Extensive suppuration followed, and although the patient was delivered at full term of a healthy child, the wound had not become firm enough to stand the severe strain of childbirth, and relapse occurred shortly afterward.

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